Remarks

The Office Action mailed July 7, 2006 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Claims 1-20 are now pending in this application. Claims 1-4 stand rejected. Claims 5-7 stand objected to. Claims 8-15 have been withdrawn from consideration. Claims 16-20 are canceled. Claims 21 and 22 are newly added. No additional fee is due for newly added Claims 21 and 22.

Reconsideration of the restriction requirement imposed under 35 U.S.C. § 121 is respectfully requested.

A restriction to either invention I, consisting of claims 1-7 drawn to a method for fabricating a composite laminate including a pin reinforcement, classified in Class 156 , subclass 92; invention II, consisting of claims 8-15 drawn to a method of making a composite laminate including a solid composite which is transitioned to a composite sandwich structure, classified in Class 156, subclass 293; or invention III, consisting of claims 16-20, drawn to a laminate composite structure, classified in class 428, subclass 116, was imposed. In response, Applicant confirms the election with traverse to prosecute the invention of Group I, claims 1-7. Claims 16-20 are canceled.

The requirement for election is traversed because the inventions set out by the claims in Groups I and II are clearly related. Applicants submit that a thorough search and examination of either Group would be relevant to the examination of the other Group and would not be a serious burden on the Examiner. Additionally, requirements for election are not mandatory under 35 U.S.C. 121. Accordingly, reconsideration of the election requirement is requested.

The rejection of Claims 1-3 under 35 U.S.C. § 102(b) as being anticipated by Campbell et al. (U.S. Patent No. 5.789,061) is respectfully traversed.

Claim 1 recites a method for fabricating a laminate composite structure that includes "layering a plurality of plies of material with interspersed orientations within a stacking sequence to create a solid laminate" and "inserting a plurality of pins into the solid laminate composite, prior to curing the laminate composite, at locations in the geometry of the solid laminate where the solid laminate forms a bend."

Campbell et al. do not describe, nor suggest, a method that includes layering a plurality of plies of material with interspersed orientations within a stacking sequence to create a solid laminate. More specifically, and as described above, Campbell et al. describe that the composite structure includes a stiffener member and skin member made up of individual plies of fabric reinforced by a resin matrix. There are no description that the structure of Campbell et al. includes interspersed orientations within a stacking sequence. Two individual plies would not be fairly construed as a stacking sequence of interspersed orientations. Additionally, Campbell et al. do not describe creation of a solid laminate. Rather, and referring to Column 3, lines 61-63, Campbell et al. describe a "noodle region" which does not include any layered material. As Campbell et al. do not describe creation of a solid laminate, Campbell et al. also do not describe, nor suggest, insertion of pins into a solid laminate.

Referring to Column 3, line 53 to Column 4, line 63, Campbell et al. describe a stiffener 12 attached to skin member 10. Stiffener member 12 and skin member 10 are composite components made up of individual plies of fabric reinforced by a resin matrix. Stiffener member 12 includes web portion 14 and flange portions 16, and flange portions 16 reside on skin member 10. Between web portion 14 and flange portion 16 is radius region 18. Area 20 is called the "noodle region" and is typically filled with a "stiffener noodle" made of a fiber rope impregnated with resin. Discrete reinforcing pins 22, 24, and the like are disposed through radius region 18 of stiffener member 12, through the stiffener noodle in area 20, and into skin member 10 to secure stiffener member 12 to skin member 10 at the critical radius region 18. Additional reinforcing pins 26, 28, 30, 32 and the like are disposed through flange portions 16 of stiffener member 12 and into skin member 10 to resist crack propagation at the joint region between stiffener member 12 and skin member 10.

Stiffener member 12 includes two pieces of composite material 50 and 52 each making up one half of web portion 14 as shown in Figure 1. Members 50 and 52 are bent into i-shapes and placed back to back defining web portion 14 and flange portions 16. Reinforcing pins 54, 56, and 58 as shown secure members 50 and 52 to each other thus forming stiffener web portion 14. In addition to a stiffener noodle within noodle region 20, softening layers 60 are disposed within noodle region 20 about radius region 18. Stiffener member 12 and skin member 10 may be a fiber matrix structure formed of plies of fiber in a cured resin matrix, plies of fiber in an uncured resin matrix combined as a prepreg, a preform material of fibrous material and a tackifier, or even raw fiber matting which has yet to be impregnated with resin.

The pins are preferably inserted by the use of ultrasonic transducer 70. A number of such pins are first disposed in compatible body 72 which is formed to match the curvature of radius region 18. Ultrasonic transducer 70 is then used to impart ultrasonic energy to the pins while at the same time pressure, as depicted by force vector F, is applied to compress body 72 and to drive the pins through the radius region 18 and into skin member 10. Body 72 conveniently maintains the pins in their proper orientation during the step of applying ultrasonic energy and pressure. The use of ultrasonic energy also causes localized melting about the pins which further facilitates a strong bond between stiffener 12 and skin member 10.

For the reasons set forth above, Claim 1 is submitted to be patentable over Campbell et al.

Claims 2 and 3 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2 and 3 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2 and 3 likewise are patentable over Campbell et al.

For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1-3 be withdrawn.

The rejection of Claims 1-4 under 35 U.S.C. § 103 as being unpatentable over Campbell et al. in view of David (U.S. Patent No. 4,854,990) is respectfully traversed.

Campbell et al. is described above. David describes construction of a structural body, such as a typical nose cone, which includes, orthogonally disposed reinforcing fibers 51 and 52 that are embedded in a matrix material 53 to provide strength. Fibers such as 51 and 52 may be rearranged to provide reinforcements such as 55 and 56 wound around the supporting substructure, and spikes such as 57 and 58 are oriented radially and normally to the external surface so as to provide good anti-ablation characteristics. Spikes 57 and 58 provide strength in the radial direction, which is required when high tensile stresses are locally created in that direction. Because of the body shape, the length of the spikes varies considerably from spike 57 to spike 58. It is necessary to vary the number of spikes per unit of conical area of substructure conical surfaces-- or spike distribution density-- in direct ratio with the distance of any point on that surface to centerline 54.

Claim 1 recites a method for fabricating a laminate composite structure that includes "layering a plurality of plies of material with interspersed orientations within a stacking sequence to create a solid laminate" and "inserting a plurality of pins into the solid laminate composite, prior to curing the laminate composite, at locations in the geometry of the solid laminate where the solid laminate forms a bend."

Campbell et al. in view of David do not describe, nor suggest, a method that includes layering a plurality of plies of material with interspersed orientations within a stacking sequence to create a solid laminate. More specifically, and as described above, Campbell et al. describe that the their composite structure includes a stiffener member and skin member made up of individual plies of fabric reinforced by a resin matrix. There are no recitations that the structure of Campbell et al. includes interspersed orientations within a stacking sequence. Two individual plies would not be fairly construed as a stacking sequence of interspersed orientations. Additionally, Campbell et al. do not describe creation of a solid laminate as described above. With respect to David, David merely describes spikes 57 and 58 that are oriented radially and normally to an external surface, which vary in distribution density in direct ratio with the distance of any point on that surface to a centerline of a structure.

For the reasons set forth above, Claim 1 is submitted to be patentable over Campbell et al. in view of David.

Claims 2-4 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2-4 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2-4 likewise are patentable over Campbell et al. in view of David.

For the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 1-4 be withdrawn.

The objection to Claims 5-7 is respectfully traversed. Claims 5-7 depend, directly or indirectly, from independent Claim 1 which is submitted to be patentable for the reasons given above. For these reasons, Applicants request that the objection to Claims 5-7 be withdrawn.

Newly added Claims 21 and 22 depend from independent Claim 1. When the recitations of these claims are considered in combination with the recitations of Claim 1, Applicants submit that Claims 21 and 22 likewise are patentable over the cited art.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,

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